

Name _____

22M:002

December 11, 2003

Score (200 possible) _____

Final Exam

Answer each question to the best of your ability. Show all of your work.

1. Expand: $(x+2)^4$. (10 points)

2. Simplify the following expression as much as possible. (10 points)

$$\log_{12} 4 + \frac{1}{2} \log_{12} 9 - \log_{12} 24$$

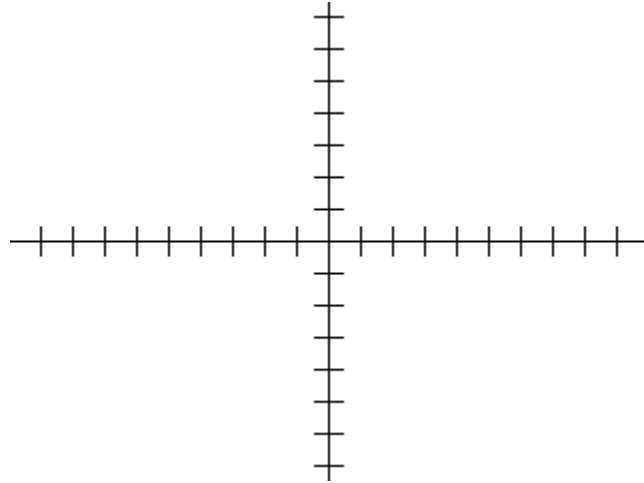
3. Find the center and radius of the circle with equation $x^2 + 2x + y^2 + 4y + 1 = 0$. (10 points)

4. Find the inverse of the function $f(x) = 3x^3 - 4$. (10 points)

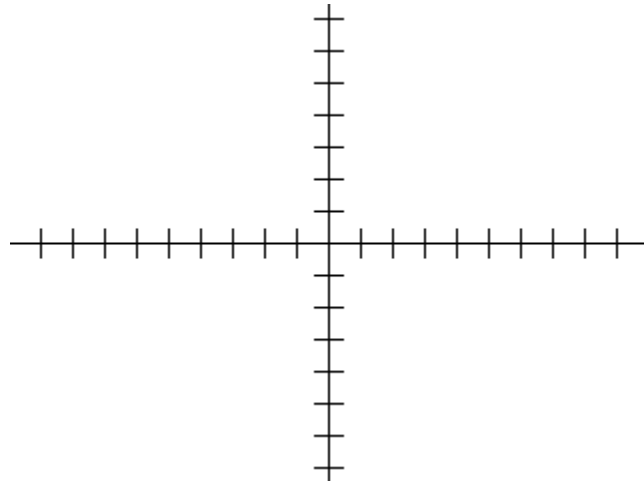
5. Rewrite the following expression as a single logarithm with coefficient 1. Simplify as much as possible. (10 points)

$$\frac{1}{2} \log_y (p^3 q^4) - \frac{2}{3} \log_y (p^4 q^3)$$

6. a) Graph the line $5x - y = 2$. (4 points)
b) Find the equation of a line parallel to $5x - y = 2$ through the point $(-1, -5)$.
Graph this line with the graph of (a). (8 points)
c) Find the equation of a line perpendicular to $5x - y = 2$ through the origin.
Graph this line with the graph of (a) and (b). (8 points)
Label each line with its equation.

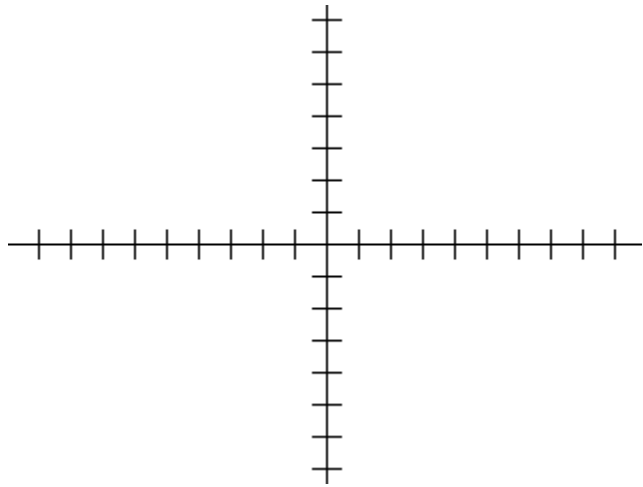


7. Sketch the function $y = \sqrt{x-4} + 2$ on the axis provided. (10 points)



8. Solve: $x^2 - x \leq 6$. Write the solution set in set or interval notation. Verify that at least one solution from your interval satisfies the inequality. (10 points)

9. Graph the function $f(x) = \begin{cases} -3x+1 & \text{for } x \leq 0 \\ x-1 & \text{for } x > 0 \end{cases}$. (10 points)



10. Solve $\ln(5+4x) - \ln(3+x) = \ln 3$ for x . (10 points)

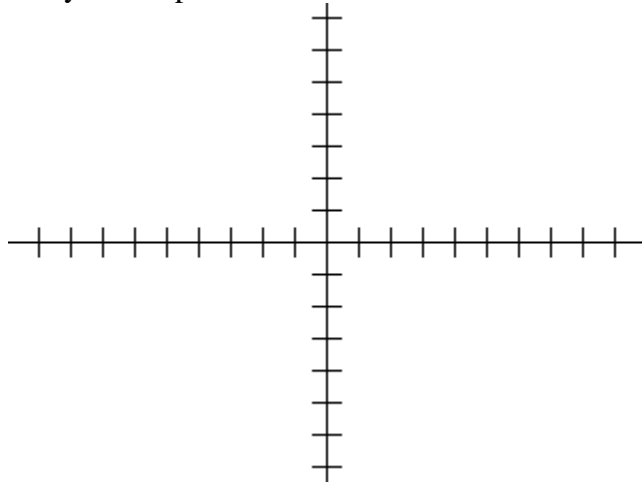
11. Solve $\left(\frac{2}{3}\right)^{x+1} = \left(\frac{27}{8}\right)^{x-1}$ (5 points)

11. Given the function $f(x) = x^4 + 10x^3 + 23x^2 - 10x - 24$

a. Find all of the factors of the function. (10 points)
(Hint: what are the possible zeros?)

b. Use synthetic division to find $f(-5)$. (5 points)

c. Graph the function. (10 points)
Hint: let each dash on the y-axis represent 4 units.



12. Given $f(x) = \frac{4x+12}{2x-10} \cdot \frac{x^2-x-20}{x^2-9}$

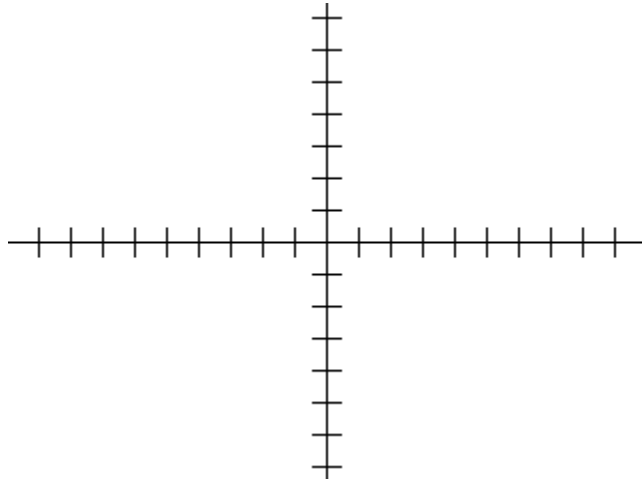
a. Simplify the function as much as possible. (10 points)

:

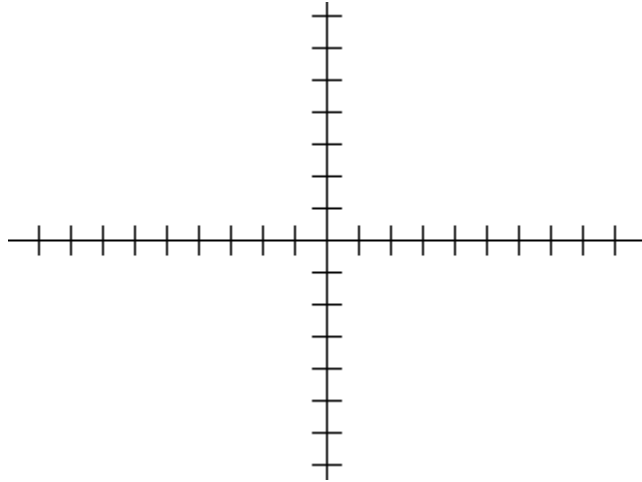
b. Using your simplified function, find all asymptotes of this function. (5 points)

c. Find all zeros of this function. (5 points)

d. Graph this function. (10 points)
(hint: start by sketching your asymptotes and plotting the zeros and y-intercept)



13. Given $f(x) = x^2 - 2x - 8$
- a. Find the axis of symmetry of the parabola. (5 points)
 - b. Find the coordinates of the parabola's vertex. (5 points)
 - c. Find the zeros of f . (10 points)
 - d. Graph f . (10 points)



Axis of symmetry _____

Vertex _____

Zeros _____ and _____

Extra Credit: (10 points maximum)

The following picture can be used to prove the Pythagorean Theorem. Explain how.
Hint: write the Pythagorean Theorem *in words* (not with numbers)

